# Preventive Medicine

# Seventh-Day Adventist Adolescents—Life-style Patterns and Cardiovascular Risk Factors

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*The life-style of adolescents attending a Seventh-Day Adventist boarding school was evaluated as it related to cardiovascular risk factors. The diet contained 34% calories as fat, with 11% derived from saturated fat. Total serum cholesterol levels were low (mean, standard deviation = 138±15 mg per dl), and apolipoprotein B level was low as well (46±9 mg per dl). The high-density lipoprotein cholesterol level was within the usual range (52.4±13.3 mg per dl). Mean blood pressures were also low (systolic, 104.1±9.6 mm of mercury; diastolic, 65.7±9.7 mm of mercury). There was no self-reported use of cigarettes. If this life-style were to continue through adulthood, the incidence of premature atherosclerotic disease, particularly coronary artery disease, for this group might well be reduced, compared with other North Americans, as suggested by findings from previous studies of adult Seventh-Day Adventists.*

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The Seventh-Day Adventist Church prohibits smoking among its members and encourages them to adopt a lacto-ovo-vegetarian diet. In several reports lower mean serum cholesterol values have been documented among practicing Seventh-Day Adventists than in the US population as a whole[1-5] and there is evidence that cardiovascular death rates from all causes are lower than in comparable non-Seventh-Day Adventist populations.[4-8] In view of the growing interest in the precursors of atherosclerosis in childhood,[9] the Seventh-Day Adventist experience presents a useful opportunity to study the effect of life-style intervention during childhood and adolescence. This study assessed life-styles as related to cardiovascular risk factors in high school students at a Seventh-Day Adventist boarding school.

## Methods

### *Study Population*

The study site was the Broadview Academy (La Fox, Illinois) a Seventh-Day Adventist boarding high school located in a rural setting 40 miles west of Chicago. About 200 students boarded at the school full time. The school cafeteria was the only on-site source of food for the students and served a lacto-ovo-vegetarian (milk and milk products, eggs and plant foods) cuisine, in keeping with Seventh-Day Adventist precepts. Students returned home for a four-day holiday on every fourth weekend and occasionally went out to dinner in local restaurants when their parents came for a visit. There were no vending machines on campus and no commercial centers within walking distance

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where students could buy food; they were allowed to have pizza and other take-out food delivered about once a month. Virtually all the students were practicing Seventh-Day Adventists and about half maintained a lacto-ovo-vegetarian diet when not at the school. Full cooperation was received from the board of directors, school officials, staff and cafeteria personnel.

Our survey was carried out in late spring. The purpose and background of the study was presented to the full student body and volunteers were solicited. Additional more detailed sessions were held with study participants to assure full cooperation. Written consent was obtained from both the students and a parent or guardian. There were no exclusions from participation and students who expressed interest in only one part of the study—for example, blood pressure measurement but not blood sampling—were included. A brief questionnaire was administered to participants to collect information on demographic and medical background. Volunteers then took part in various aspects of the study as described below.

*Nutrition Assessment*

The primary focus of the nutrition assessment was on the issue of amount and type of fat and sodium intake. Lipid content was assessed by two methods, which yielded independent data sets. An inventory of an entire food cycle (21 days) was collected. The school's record of attendance at meals enabled calculation of a per-person per-day food intake from an estimate of food disappearance. No attempt was made with the inventory method to account for plate waste. In addition, 34 volunteers were recruited to keep three-day food diaries. With the aid of food models a nutritionist instructed them in estimating food portions, and records were reviewed with them for completeness. Records were collected in April and May of 1979. Both types of records were then coded according to the system of the Nutrition Coding Center, Minneapolis, and analyzed with the use of computer tapes.[10,11]* Nutritional information about unusual commercial vegetarian products used at the Academy was obtained from the producer and added to the computer file. Sodium content of the food was also estimated by the computer system described above, excluding salt added at the table.

Duplicate meals, including all three meals on a given day, were also collected on a random subset of five participants during each of three consecutive weeks. Meals were frozen and transported to a commercial laboratory (Rosner/Runyon Laboratories, Chicago) where they were homogenized and sodium and potassium content was measured. The three meals for a given person for a single day were homogenized together and analyzed as a single sample; 15 separate samples were therefore analyzed.

*Tom Tokich carried out the computer programming work.

Twenty-four-hour urine specimens were also collected. Participants were provided vinyl carrying cases and plastic jars and carefully instructed in the procedure for complete, timed, 24-hour collections. Boric acid was added as a disinfectant. On returning the kits they were questioned regarding completeness of urine collection. In all, 24 students returned single-day specimens.

*Lipid and Lipoprotein Studies*

In May of 1979, a group of 43 students were studied after they had been on campus for eight months. Blood specimens were drawn from an antecubital fossa with the participant in a sitting position. Specimens were taken between 6 and 7 AM after a nine-hour fast. The specimens were transported immediately to the laboratory where the serum was separated and stored up to several months at −20°C. This procedure may have resulted in a slight decrease in high-density lipoprotein-cholesterol level.[12] Total serum cholesterol, triglyceride and high-density lipoprotein-cholesterol levels were measured according to the protocol of the Lipid Research Clinics†; the heparin-manganese precipitation method was used to measure high-density lipoprotein cholesterol.[13] As part of the Lipid Research Clinics program, the lipid laboratory participated in an ongoing surveillance and standardization procedure, involving both internal and external controls.[13] Apolipoproteins A-I, A-II and B were measured by a radioimmunoassay method at the laboratories of the Atherosclerosis SCORE at the University of Chicago. These techniques have been reported in detail elsewhere.[14-16]

*Blood Pressure Measurement*

Two methods of blood pressure measurement were used. An automatic device (Vita-Stat) as well as a random-zero sphygmomanometer were used. Study personnel were trained and certified according to the protocol of the national cooperative Hypertension Detection and Follow-up Program[17]; two persons made all the measurements. Each participant was asked to empty his or her bladder and remain seated quietly for five minutes. Time of day, hours since last meal and room temperature were recorded. Radial pulse rate was counted for 30 seconds and blood pressure measured with a standard mercury manometer. After a one-minute pause, the blood pressure was measured with a random-zero device, followed by another one-minute pause and a second measurement with the random-zero device. Radial pulse rate was then counted for a second time. Fourth-phase diastolic pressures were recorded. A protocol identical to that used for the random-zero was used for the Vita-Stat measurements, with the exception that a manual reading with the standard sphygmomanometer was not taken

†Lipid analyses were done in the CORE laboratories at the University of Chicago under the supervision of Donald Metlay, Judy Dunal and Karl Habermos with support from the Clinical Nutrition Research Unit (AM-26678).

first. Only systolic and fifth-phase diastolic pressures are recorded by this device.

*Height and Weight*

Height and weight were measured in light indoor clothing with shoes off; a standard balance scale was used.

## Results

*Nutrition Assessment*

Nutrient data as estimated by the inventory (disappearance) and diary methods are summarized in Table 1. Based on a usual intake of about 2,200 calories a day for this age group in the general US population, both sexes combined, these values are roughly 10% less.[18,19] Vegetarians would be expected to consume somewhat fewer calories.[20] Self-reported food records likewise consistently underestimate food intake. Plate waste accounts for a portion of the difference between self-reported data and inventory figures. Protein intake is well above the Recommended Dietary Allowance.[21] The larger polyunsaturated fat consumption indicated by inventory data is a result of methodologic differences. The food records were analyzed by the Nutrition Coding Center system, which contains estimates of fat composition as found in typical commercial US sources; in fact, polyunsaturated fat was used more generously at this institution. Thus, for example, the polyunsaturated fat content of the item "pancake" would be understated in the analysis by the Nutrition Coding Center system. The inventory reflects fat consumption directly. Cholesterol was provided almost exclusively by eggs. In Table 2 nutrient intake data on a population sample of a similar age are presented for comparison.[19] This data set was chosen primarily because the nutrient analysis was done with

TABLE 1.—*Daily Nutrient Intake, Broadview Academy, La Fox, Illinois*

Macronutrients

| *Nutrient Item* | *Food Record (N=34 sets of 3-day records) Mean±SD* | *Inventory** |
|---|---|---|
| Calories | 1,947.0±601.9 | 2,199.6 |
| Protein (grams) | 75.1± 29.1 | 91.7 |
| Total fat (grams) | 77.2± 27.0 | 100.6 |
| Saturated fatty acids (grams) | 21.1± 9.4 | 23.1 |
| Polyunsaturated fatty acids (grams) | 18.3± 8.0 | 30.5 |
| Cholesterol (mg) | 191.6±159.4 | 180.1 |
| Total carbohydrate (grams) | 238.0± 80.5 | 229.8 |
| Sucrose (grams) | 26.3± 20.0 | 30.6 |
| Starch (grams) | 94.7± 43.0 | 77.9 |
| Fiber (grams) | 5.1± 2.3 | 5.1 |
| Sodium (grams) | 2.4± 1.0 | 3.0 |
| Potassium (grams) | 2.8± 1.1 | 2.8 |
| Protein (% cal) | 15.4± 3.6 | 16.7 |
| Total fat (% cal) | 34.8± 6.5 | 41.1 |
| Saturated fatty acids (% cal) | 11.3± 2.9 | 9.5 |
| Polyunsaturated fatty acids (% cal) | 8.3± 2.8 | 12.5 |
| Total carbohydrate (% cal) | 49.8± 7.9 | 41.8 |
| Sucrose (% cal) | 5.4± 4.0 | 5.6 |
| Starch (% cal) | 19.6± 5.4 | 14.1 |
| Potassium:sodium ratio | 0.86± 0.39 | 1.19 |

Micronutrients

| *Nutrient Item* | *Food Records Mean±SD* | *Inventory* | *RDA† Boys/Girls* | *Percentile of Representative US Distribution Ages 15-17‡ Boys/Girls* |
|---|---|---|---|---|
| Calcium (mg) | 998.4± 469.5 | 1,526.0 | 1,200/1,200 | 60 |
| Phosphorus (mg) | 1,262.5± 61.2 | 1,711.9 | 1,200/1,200 | .. |
| Iron (mg) | 12.4± 4.7 | 14.6 | 18/18 | 60 |
| Vitamin A (mg RE) | 1,420.6±1,019.6 | 1,981.3 | 1,000/800 | 73 |
| Thiamine (mg) | 1.4± 0.5 | 5.5 | 1.4/1.1 | 98 |
| Riboflavin (mg) | 2.1± 1.0 | 3.5 | 1.7/1.3 | 59 |
| Niacin (mg) | 19.0± 8.2 | 26.5 | 18/14 | 70 |
| Vitamin C (mg) | 126.2± 73.3 | 70.3 | 60/60 | 77 |

SD=standard deviation; RE=retinoid equivalents

*(See text for method of inventory taking) based on a single month, therefore no standard deviation.
†Recommended Daily Allowances, ages 15-18, revised 1980, National Academy of Sciences, National Research Council.[21]
‡Health and Nutrition Examination Survey, 1971-1974, compared with food record mean values.[18]

the same method—that is, using the procedures of the Nutrition Coding Center—and allows direct, detailed comparison of dietary lipids.[19] Information was not available for identical age groups; the composition of the diet is the major issue, however, and changes little over this narrow age range.[19] The primary contrast is the lower intake of total fat, cholesterol and particularly saturated fat among vegetarians, with a correspondingly higher potassium-to-sodium ratio.

TABLE 2.—*Daily Nutrient Intake, School Children, Cincinnati, Ohio, Ages 13-15**

| Nutrient Item | Mean† $\bar{X}$ |
|---|---|
| Calories | 2,302 |
| Protein (grams) | 80 |
| Total fat (grams) | 97 |
| Saturated fatty acids (grams) | 41 |
| Polyunsaturated fatty acids (grams) | 14 |
| Cholesterol (mg) | 295 |
| Total carbohydrate (grams) | 263 |
| Starch (grams) | 106 |
| Sucrose (grams) | 65 |
| Protein (% cal) | 15 |
| Total fat (% cal) | 38 |
| Saturated fatty acids (% cal) | 17 |
| Polyunsaturated fatty acids (% cal) | 6 |
| Total carbohydrate (% cal) | 47 |
| Potassium:sodium ratio | 0.35 |

*From Morrison et al.[19]
†50th percentile, recalculated as weighted mean of boys and girls.

For the micronutrients the intake of the Seventh-Day Adventist youngsters based on food record data is somewhat low relative to the Recommended Dietary Allowances (Table 1), whereas inventory values are above the Recommended Dietary Allowances in every instance with the exception of iron. Based on the Health and Nutrition Examination Survey (HANES) of 1971 through 1974, the mean values for micronutrients from the dietary records are all above the 50th percentile (Table 1).[18]

Sodium intake, 4.97±2.06 grams a day, as assessed by direct chemical analysis of duplicate meals, was somewhat above the US mean[22,23]; serum potassium level was 3.56±1.71 grams per day. For 24 single-day urine collections, mean sodium content was 2.55±1.36 grams and potassium was 1.88±0.77 grams. Reasonable agreement exists among the three indirect methods of estimating sodium—that is, 2.4, 3.0 and 2.6 grams for the food records, inventory and urine collections, respectively. Because the first method did not include table salt and the last may represent less than complete collections, these estimates are probably an understatement of intake. The 30% to 40% higher value for direct analysis is probably more accurate. Technical error for chemical analysis, based on eight replicate samples submitted blindly to the laboratory, was 10.7 mEq for sodium and 6.9 mEq for potassium, yielding 10.2% for both (error ÷ sample mean × 100). A large proportion of the sodium in the diet was

TABLE 3.—*Serum Lipids and Lipoproteins in Seventh-Day Adventist Adolescents*

| Variables | Boys (N=16) $\bar{X}\pm SD$ | Girls (N=24) $\bar{X}\pm SD$ | Total (N=40) $\bar{X}\pm SD$ | Lipid Research Clinics* Boys (N=160) $\bar{X}\pm SD$ | Lipid Research Clinics* Girls (N=164) $\bar{X}\pm SD$ |
|---|---|---|---|---|---|
| Age | 16.5± 1.2 | 16.3± 1.3 | 16.4± 1.2 | 16-17 | 16-17 |
| Weight | 138.7±24.0 | 128.1±30.3 | 132.4±28.0 | .... | .... |
| Total cholesterol | 133.2±14.5 | 141.0±14.8 | 137.5±14.9 | 152.1±22.8 | 159.7±26.9 |
| Triglycerides | 57.8±34.6 | 63.3±25.6 | 60.8±29.6 | 78.4±56.9 | 71.0±32.3 |
| HDL-C | 52.4±13.3 | 55.1±12.7 | 53.8±12.7 | 45.6±10.1 | 52.8±12.8 |
| Apoprotein A-I | 113.0±17.5 | 120.0±18.2 | 117.2±18.0 | .... | .... |
| Apoprotein A-II | 15.9± 2.0 | 14.3± 2.0 | 15.0± 2.0 | .... | .... |
| Apoprotein B | 45.1± 8.8 | 45.7± 9.6 | 45.5± 9.2 | .... | .... |

SD=standard deviation, HDL-C=high-density lipoprotein cholesterol

*From *The Lipid Research Clinics Population Studies Data Book, Vol. 1—The Prevalence Study.*[25]

TABLE 4.—*Correlation Matrix of Serum Lipid and Lipoprotein Levels in Seventh-Day Adventist Adolescents (N=40)*

| | Weight | Age | Total Cholesterol Level | Triglycerides | HDL-C | Apoprotein A-I | Apoprotein A-II | Apoprotein B |
|---|---|---|---|---|---|---|---|---|
| Weight | ... | | | | | | | |
| Age | .12 | ... | | | | | | |
| Total cholesterol | −.16 | .04 | ... | | | | | |
| Triglycerides | .09 | −.22 | .26 | ... | | | | |
| HDL-C | −.19 | .04 | .31* | −.45† | ... | | | |
| Aproprotein A-I | −.23 | .03 | .30* | −.05 | .74† | ... | | |
| Apoprotein A-II | .03 | .38† | −.01 | −.33* | .51† | .28* | ... | |
| Apoprotein B | .15 | −.06 | .37* | .34* | −.52† | −.52* | −.20 | . |

HDL-C=high-density lipoprotein cholesterol

*$P$ .05
†$P$ .01

provided by soy products served as meat substitutes, as well as the usual sources in condiments.

*Serum Lipids and Lipoproteins*

The total serum cholesterol levels are low (Table 3).[24,25] The highest value was 166 mg per dl, and the lowest, 109. The laboratory used in this study is part of the Lipid Research Clinics Program so the data are directly comparable with the large-scale population survey used here as the basis for comparison.[25] Quetelet index, as a measure of obesity, was similar to the general US population: BVA (Broadview Academy [study]) 22.6, HANES 22.0.[26]

Levels of high-density lipoprotein cholesterol are above the usual population mean for boys, but at similar levels for girls.[25] Both apoproteins A-I and A-II are slightly lower for this sample than for the normal values in this laboratory and apoprotein B levels are, of course, very low. Control values for comparison based on 50 medical students, ages 25 through 35, with normal serum lipid values for apoproteins from this laboratory are (mean ± standard deviation): apoprotein A-I, 120±17 mg per dl; apoprotein A-II, 26±4 mg per dl, and apoprotein B, 75±18 mg per dl.

Intercorrelations among lipids, lipoproteins, apoproteins and body size are shown in Table 4. The age range for this sample is very narrow, though a correlation is apparent between age and apoprotein A-II. Total cholesterol level is significantly related to high-density lipoprotein cholesterol, apoprotein A-I and apoprotein B. Triglyceride values were negatively related to high-density lipoprotein cholesterol and apoprotein A-II, but positively related to apoprotein B. By the same token, the high-density lipoprotein cholesterol level was positively correlated with its apoproteins A-I and A-II, whereas a negative relationship existed with apoprotein B. Although these relationships are well established, it is of interest that they persist at such low levels of total cholesterol.

Within this sample, mean blood pressures are also low compared with those of other groups of adolescents (Table 5). It is particularly difficult in the case of blood pressure, however, to make precise comparisons with other population samples. Blood pressures as reported here represent (1) the mean of two random-zero readings, each one minute apart, and (2) the mean of two Vita-Stat readings, a minute apart, both taken after an initial five-minute rest. No persons were found with pressures above the 95th percentile for the US population.[27,28]

As noted previously, there was no reported use of cigarettes or alcohol. Given the high level of religious commitment involved in attending this school, if these substances are used at all it would be very infrequently. There was additionally no reported use of oral contraceptives.

## Discussion

Death from cardiovascular diseases accounts for half of the mortality in the United States.[29] A significant proportion of the risk of dying of the atherosclerotic diseases can be accounted for by the three major risk factors: elevated serum cholesterol level, hypertension and the use of cigarettes.[29] The Seventh-Day Adventist population in the United States has been of particular interest to cardiovascular epidemiologists, in part because their mortality experience offers some rough estimate of the possible prevention of atherosclerosis through life-style modification. The adolescents who were the subject of this report adhere strictly to the Seventh-Day Adventist health precepts because they attend a church-operated boarding school. Based on current knowledge, these young people enjoy an extremely favorable cardiovascular risk status and, if this life-style persists throughout adulthood, they can expect a reduced rate of coronary heart disease relative to the general US population. Total cholesterol values in these adolescents are very low; the mean cholesterol value for this sample (138 mg per dl) is around the 15th percentile for adolescents aged 10 through 19 in the US.[25] Population means in this range in the United States have only been reported for other vegetarian groups. In a previous study of vegans (total vegetarians) total cholesterol levels of 123±27 mg per dl were reported for the age range 16 through 29, both sexes combined.[20] In a group of young adults, ages 20 through 30, who also ate food only of plant origin, the total serum cholesterol level was 125±19

TABLE 5.—*Blood Pressure in Seventh-Day Adventists and Selected US 16-Year-Olds*

| *Variable* | *Seventh-Day Adventists N=63* | *NHLBI Task Force*†* | *HANES†‡* |
|---|---|---|---|
| Systolic blood pressure | 104.1± 9.60 | 123.3 | 116.4 |
| (Vita-Stat) (mm/mercury) | 107.6±10.10 | ... | ... |
| Diastolic blood pressure | 65.7± 9.70 | 76.5 | 71.1 |
| (Vita-Stat) (mm/mercury) | 65.6± 6.80 | ... | ... |
| Weight (kg) | 63.6± 9.98 | ... | 62.2 |
| Height (m) | 1.7± 0.09 | ... | 1.7 |

NHLBI=National Heart, Lung and Blood Institute, HANES=Health and Nutrition Examination Survey

*From *Report of the Task Force on Blood Pressure Control in Children.*[28]
†Weighted mean, boys and girls.
‡From *Blood Pressure Levels of Persons 6 to 74 Years, United States, 1971-1974*[26] and *NCHS Growth Curves for Children, Birth to 18 Years.*[27]

mg per dl for men and 133 ± 21 mg per dl for women.[30] Rural groups with a subsistence agricultural way of life have also been found to have low plasma lipid levels.[31-34] The Tarahumara Indians of Mexico, who consume small amounts of animal products, were reported to have total cholesterol levels in the area of 115 mg per dl for boys and girls, ages 5 through 18.[34] A previous study of free-living Seventh-Day Adventist teenagers in Australia, not all of whom were vegetarians, yielded a mean cholesterol level of 161 ± 28 mg per dl.[35] Given the lacto-ovo-vegetarian diet of the participants in this study, the finding of mean values slightly above that of strict vegetarians would be expected. The frequent use of soy-protein main dishes may have contributed an additional cholesterol-lowering effect.[36] The diet consumed at this boarding school appears to be nutritionally adequate. As found in previous reports, when carefully supervised a vegetarian diet provides sufficient quantity and quality of food intake for normal growth and development.[37-39] In a similar study in a boarding school serving the usual American diet, mean serum cholesterol levels were 170 mg per dl for the same age range.[40]

Among the serum lipoproteins, the high-density lipoprotein-cholesterol values reported here are slightly higher than those found in either of the other two US vegetarian groups previously studied and considerably higher than for the Tarahumara.[20,30,34] Because high-density lipoprotein-cholesterol level, at least in this and several other studies, bears a weak positive correlation to total cholesterol level, that finding could be explained by the higher values of total cholesterol observed here, although interlaboratory differences cannot be ruled out. Apolipoproteins were measured in only one of the other studies on US vegetarians.[30] The apoprotein B values are comparable, though the apoprotein A-I levels are higher in this group.[30] Control values in these two laboratories are similar so the reason for the pronounced difference in apoprotein A-I is not readily apparent (about 115 versus 80 mg per dl). The observed correlations between the lipoproteins, apoproteins and weight generally confirm those in previous reports.[30,41,42] It is of interest that at this level of serum lipids, high-density lipoprotein-cholesterol and apolipoprotein A-I levels bear an equally strong correlation with total cholesterol as does apoprotein B. Although earlier reports generally showed a lack of correlation between high-density lipoprotein-cholesterol and total cholesterol levels,[32,43,44] more recent studies show a positive correlation both within and between populations.[20,31,34,41,45] Among those studies showing a positive relationship, mean cholesterol levels were low; it may be that this finding exists primarily among children or groups without significant hypercholesterolemia.

If one assumes that humans consumed a diet relatively low in saturated fat and cholesterol during most of their evolution[46] and that the level of serum lipids that is optimal for health is in the range observed here,[47] the correlations observed in this population group may reflect a more normal physiologic state. A lipid transport system that is overburdened may show abnormal interactions between the component parts, particularly very-low-density and high-density lipoprotein cholesterol.

Blood pressure levels recorded here are low. A previous report has suggested that Seventh-Day Adventists have lower blood pressures than the general population,[48] and higher intake of polyunsaturated fat has been offered as one possible explanation.[49] A recent report failed to confirm lower blood pressures in free-living Seventh-Day Adventist children.[50] However, it is difficult to offer exact comparisons between the sample studied here and the general population because of the small numbers and the lack of a directly comparable method. It seems reasonable to conclude, nonetheless, that these adolescents are at similar or, more likely, lower risk of subsequent hypertension developing. The sodium content of the diet was comparable to the US mean, a finding that is not altogether consistent with current thinking about the role of excess sodium in the development of essential hypertension in societies like the United States.

The absence of cigarette smoking in this group further contributes to the lowered cardiovascular risk status. From the initial studies showing an improved mortality among Seventh-Day Adventists, it appeared that all of the observed health advantages could be attributed to the absence of a cigarette habit.[51] Subsequent studies, however, have shown that although smoking makes a considerable contribution, other differences in life-style, presumably dietary, play an additional role.[52] Among those persons, many of whom had not been Seventh-Day Adventists since birth, mortality rates were reduced by about a third relative to the general population, and were lower not only for coronary heart disease but for the major forms of cancer—that is, lung, breast and colon.[52] It seems reasonable to assume that this life-style pursued from childhood would result in additional gains. Furthermore, although the food served at the institution studied here was composed in large part of special vegetarian recipes, soy meat substitutes in particular, it did not involve a severe restriction of calories from fat and more or less approximated current recommendations.[22] The impact on serum cholesterol level was, on the other hand, significant and should certainly serve to reduce the risk of premature atherosclerotic disease. The low risk status attained as a result of the life-style adopted by this population has much to offer as a general public health model.

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